CLEMSON UNIVERSITY

Wind Power Potential of the Southeast

Georgia Institute of Technology Clean Energy Speakers Series

Dr. Nikolaos Rigas
Director, Renewable Energy Programs

Reshaping the world's energy future.

US Wind Market Driven by State Policies

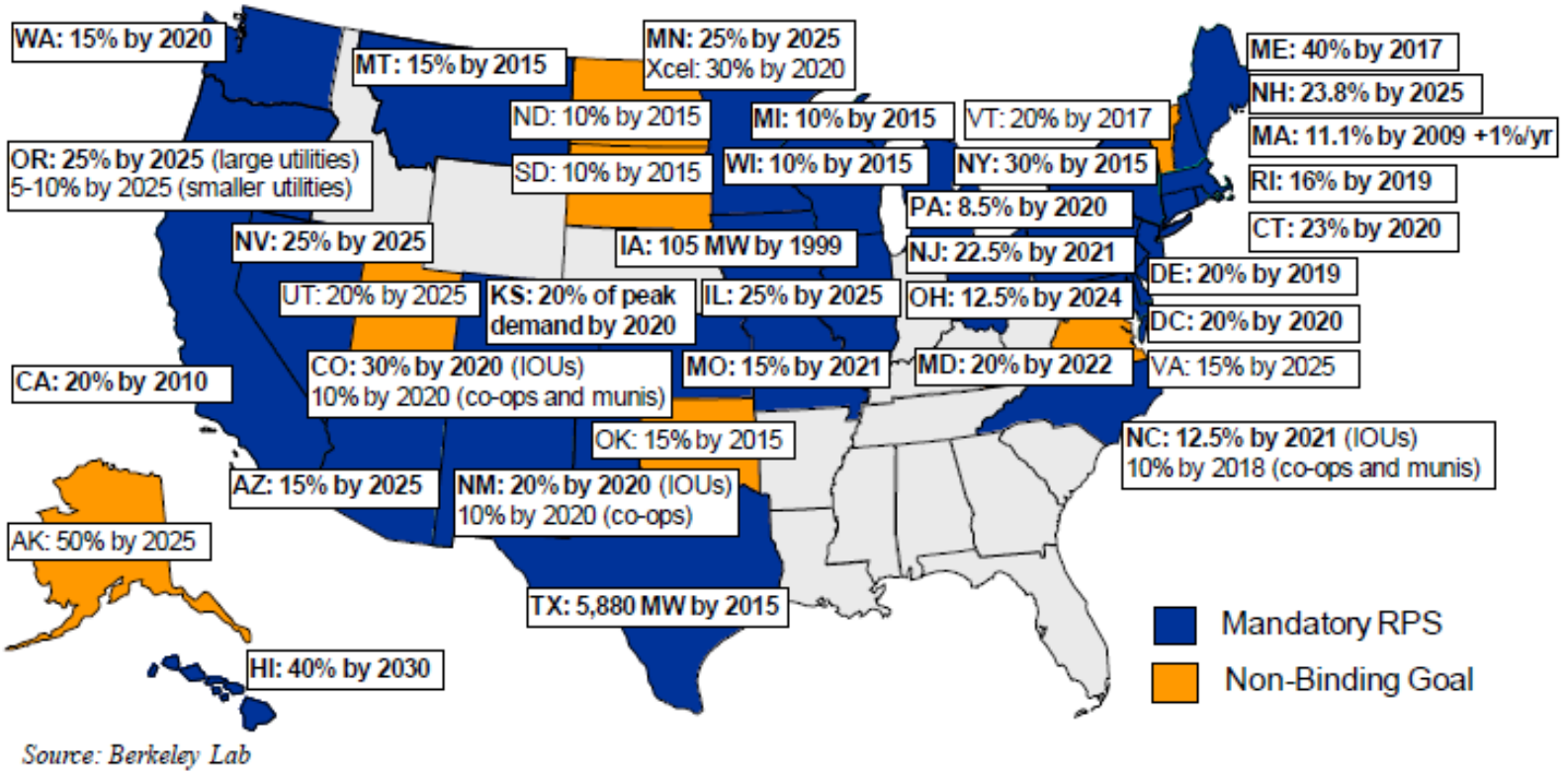
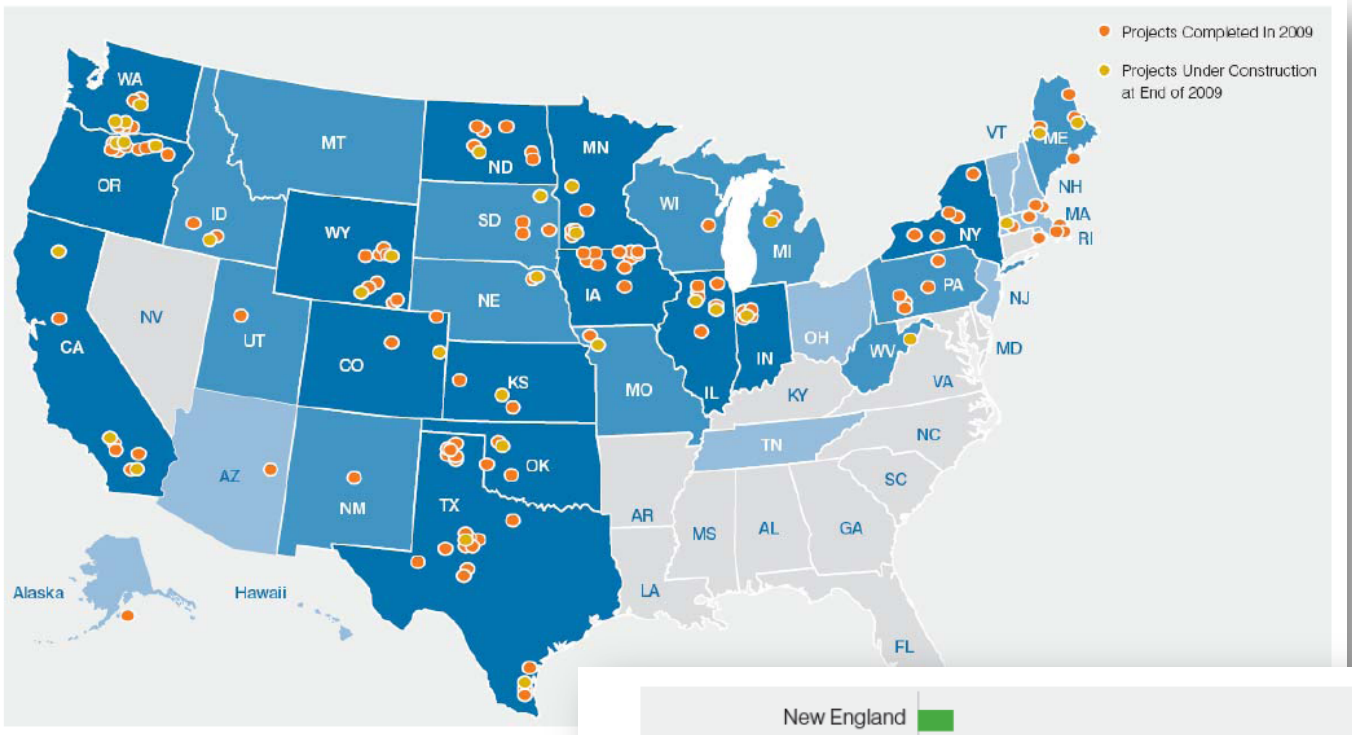


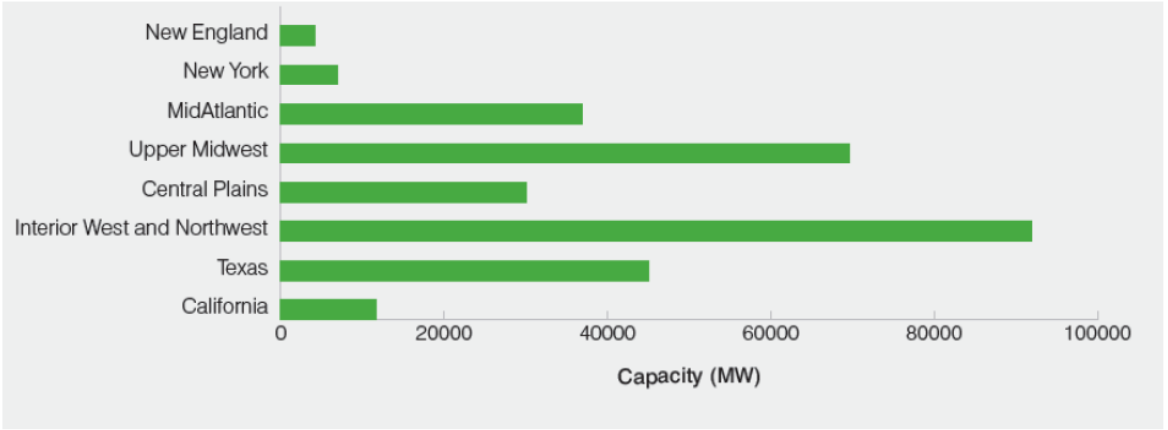
Figure 38. State RPS Policies and Non-Binding Renewable Energy Goals (as of July 2010)

- ✓9,922 MW ($20Bn) of new capacity added in 2009
- ✓US reaches 35,159 MW ($70 Bn) of total installed capacity

Wind Project Historically in the Midwest

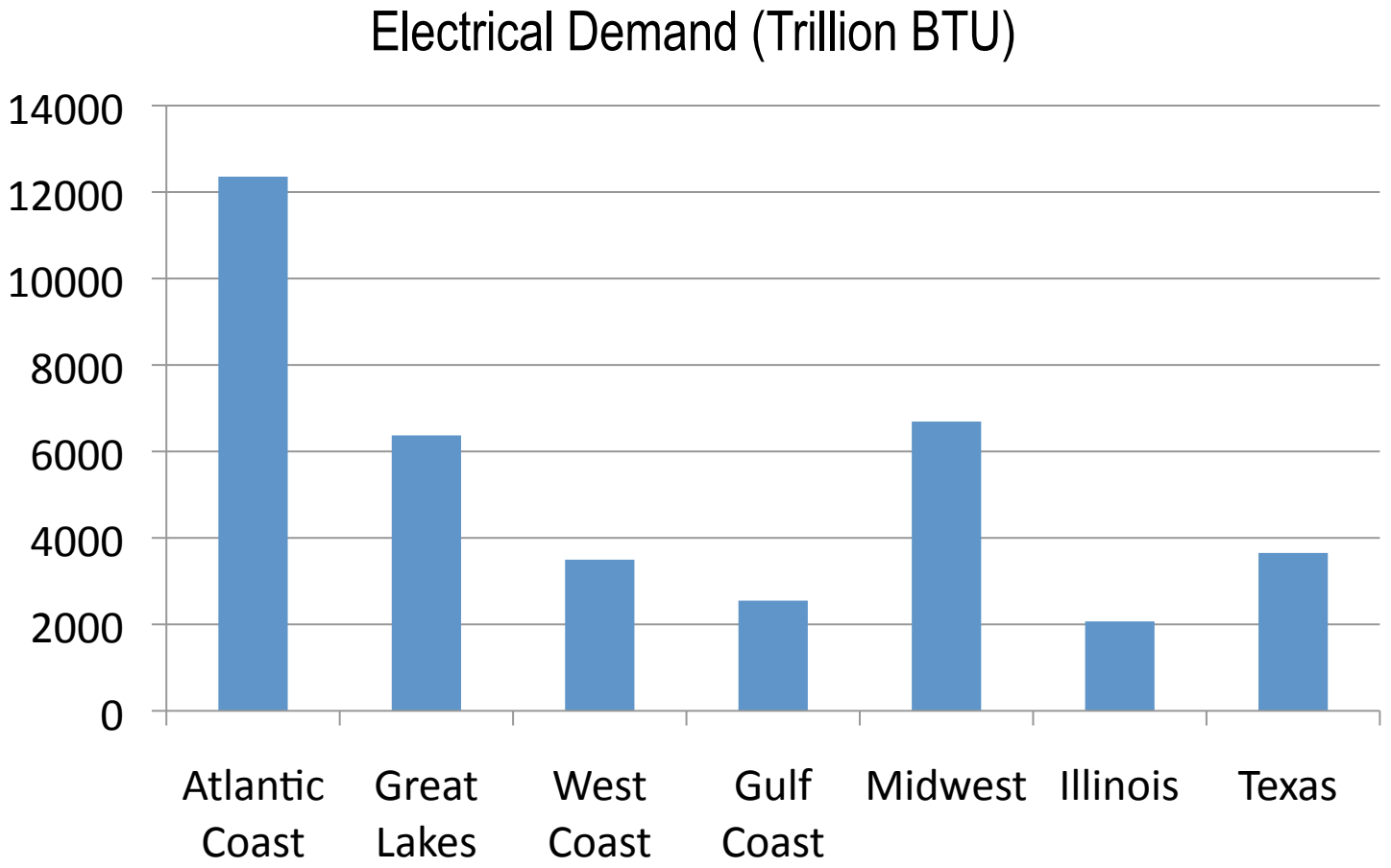


Source: American Wind Energy Association U.S. Wind In



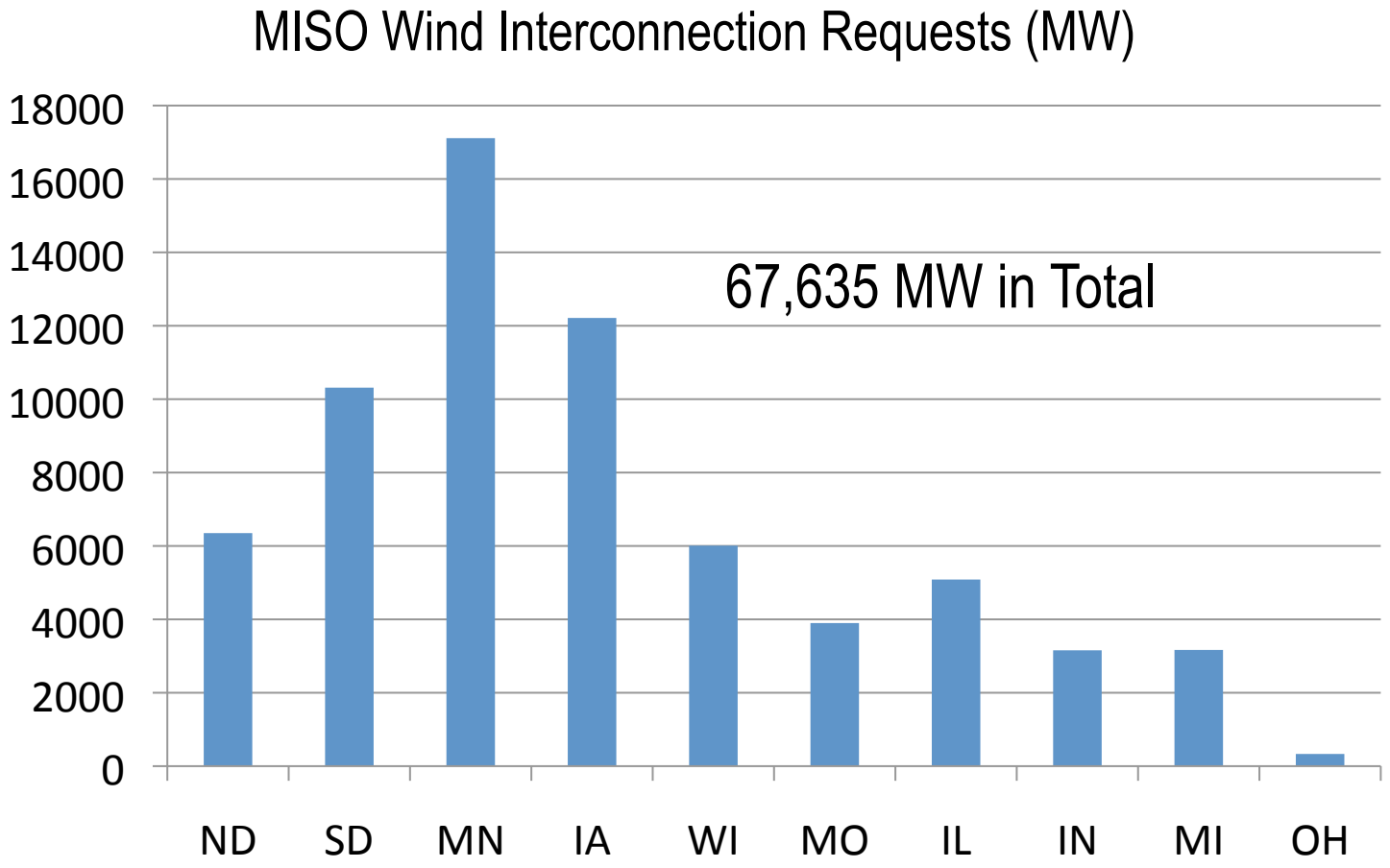
Source: American Wind Energy Association U.S. Wind Industry Annual Market Report – Year Ending 2009

Large Electrical Demand on East Coast



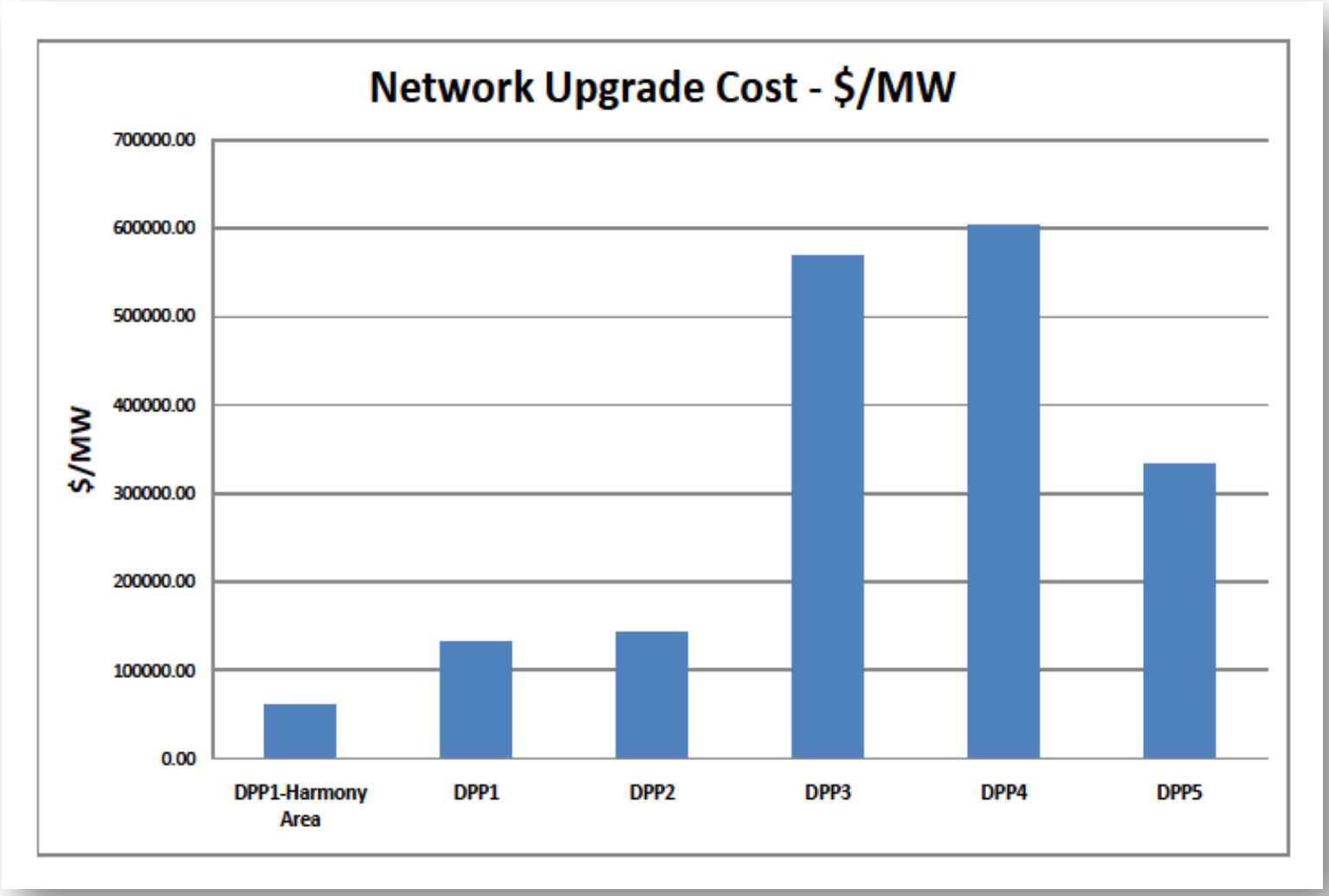
Information from US EIA State Energy Data 2008

Midwest Interconnection Requests Outpace Demand



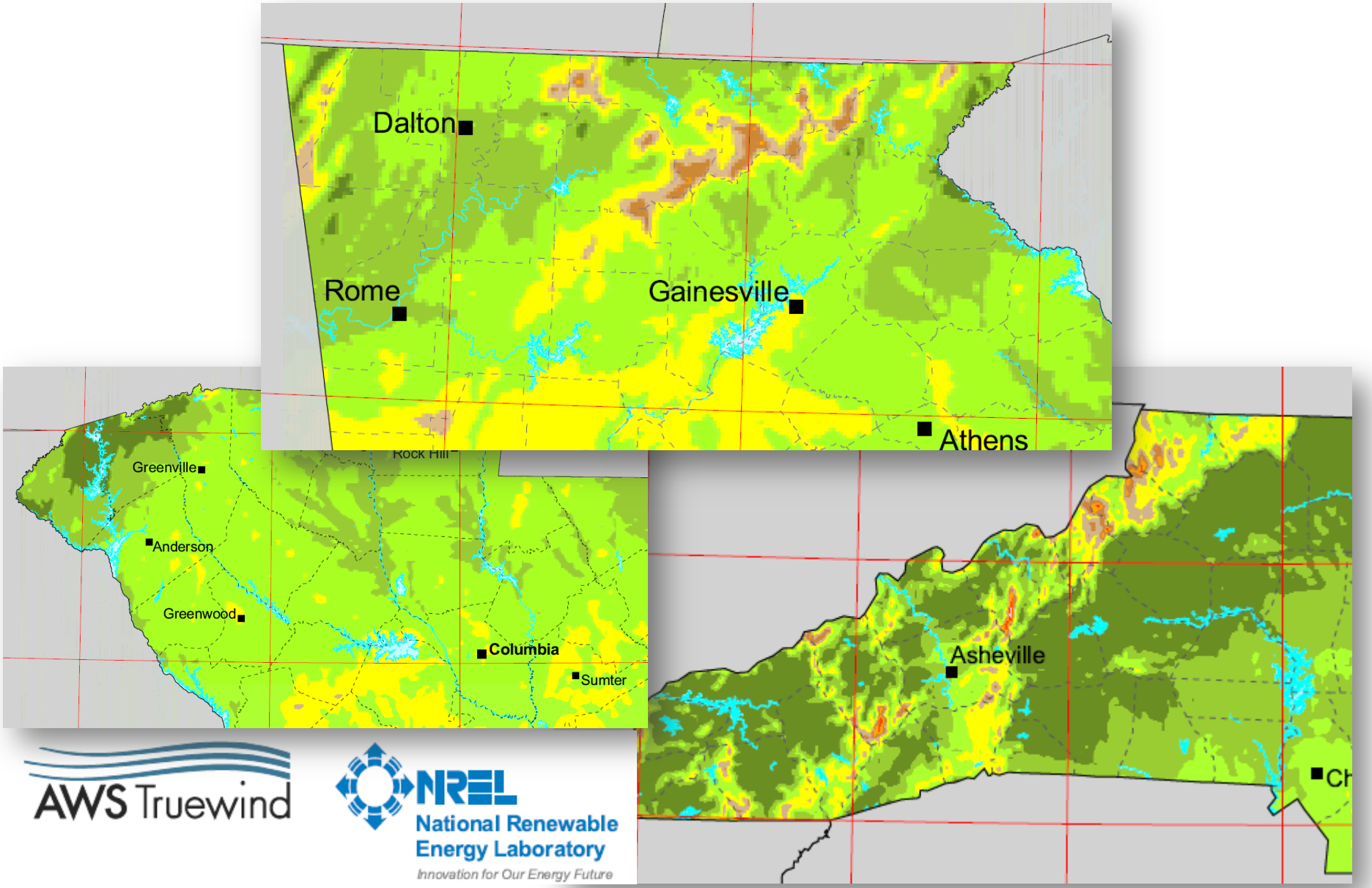
Data from Midwest Independent Transmission Operator Website

Transmission congestion increases costs



- ✓DPP1 and DPP2 show economically viable upgrade costs.
- ✓Projects in DPP3 and DPP4 face substantial upgrade costs.

Land-based resources currently limited to mountains



AWS Truewind

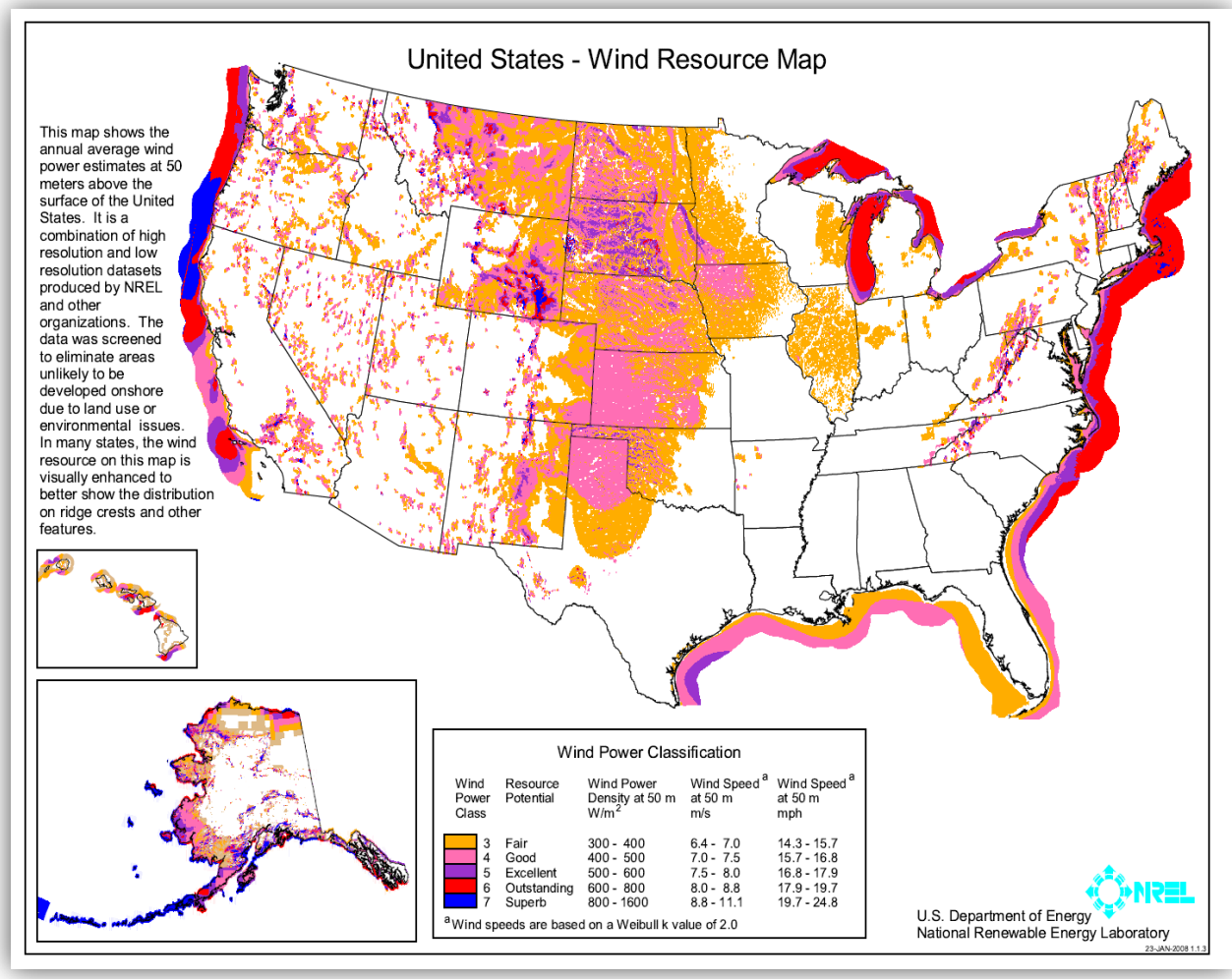
NREL
National Renewable Energy Laboratory
Innovation for Our Energy Future

US offshore wind resources near demand centers with robust transmission infrastructure

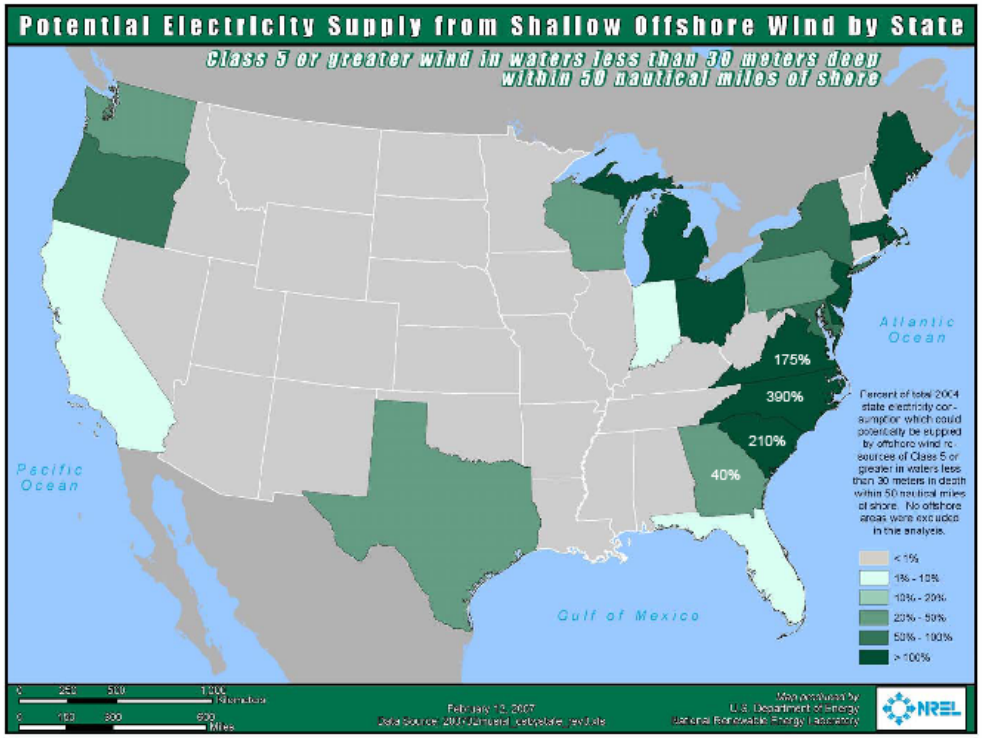
28 Coastal States consume over 78% of the electrical demand in the United States.

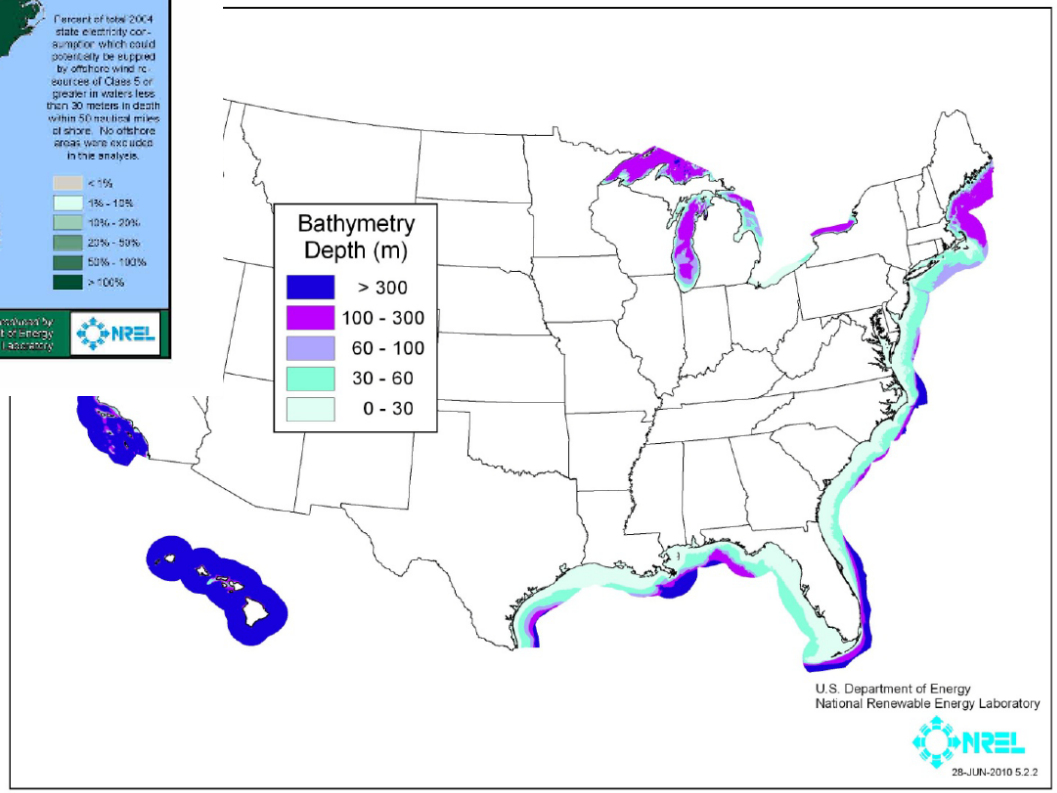
Only 6 have significant land-based wind resources.

26 of the states have offshore wind resources to meet 20% scenario.



Offshore wind resource excellent in the Southeast





with the added benefit of shallow waters off the coast.

Recent wind maps from NREL show significant resource

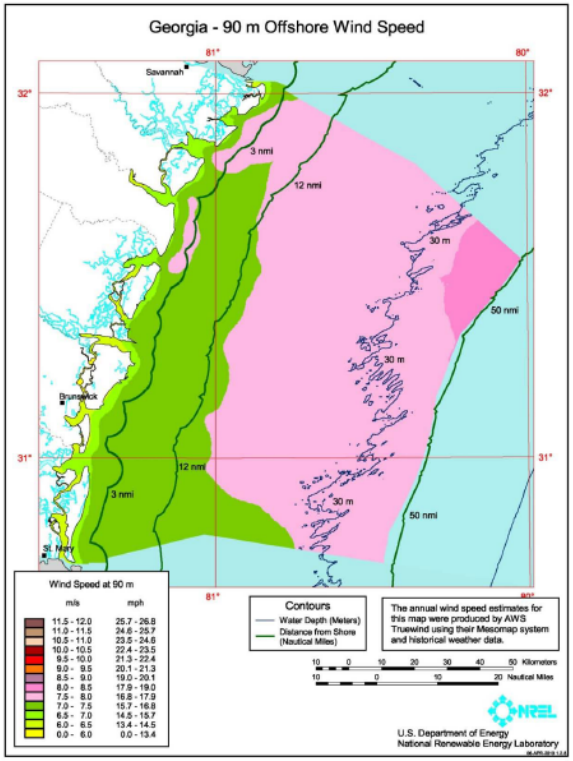


Figure B5. Georgia detailed map

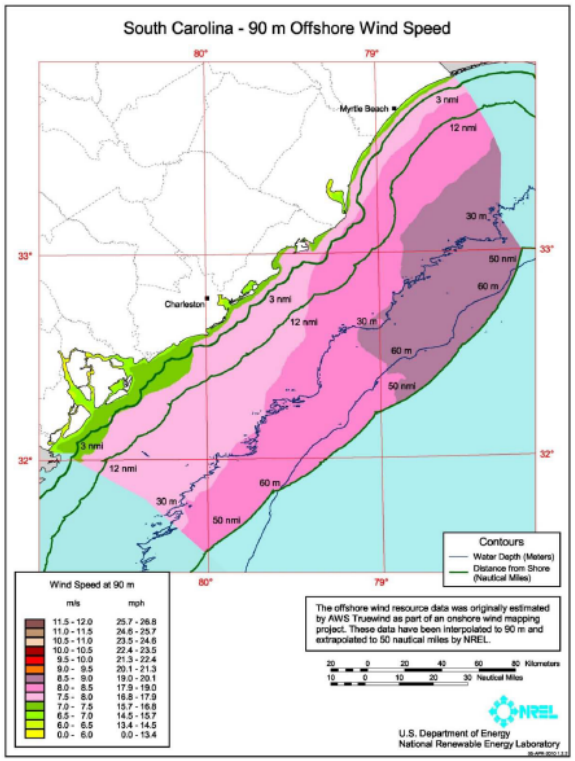


Figure B23. South Carolina detailed map

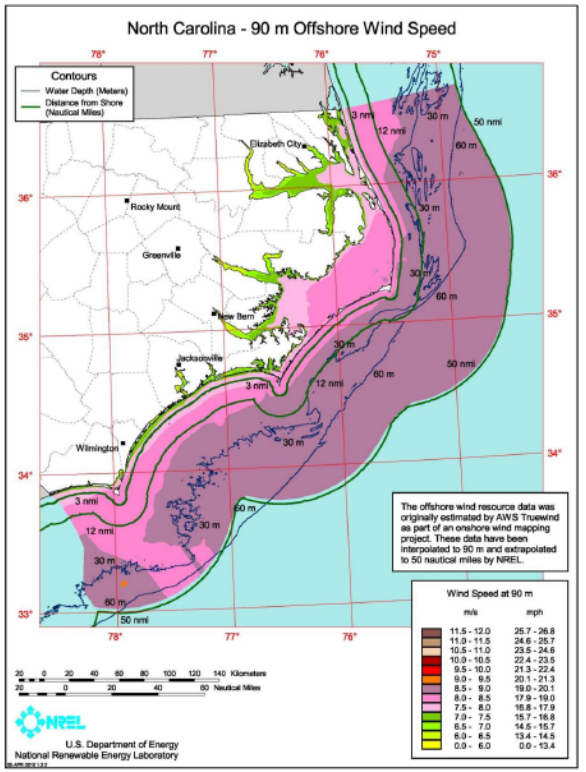


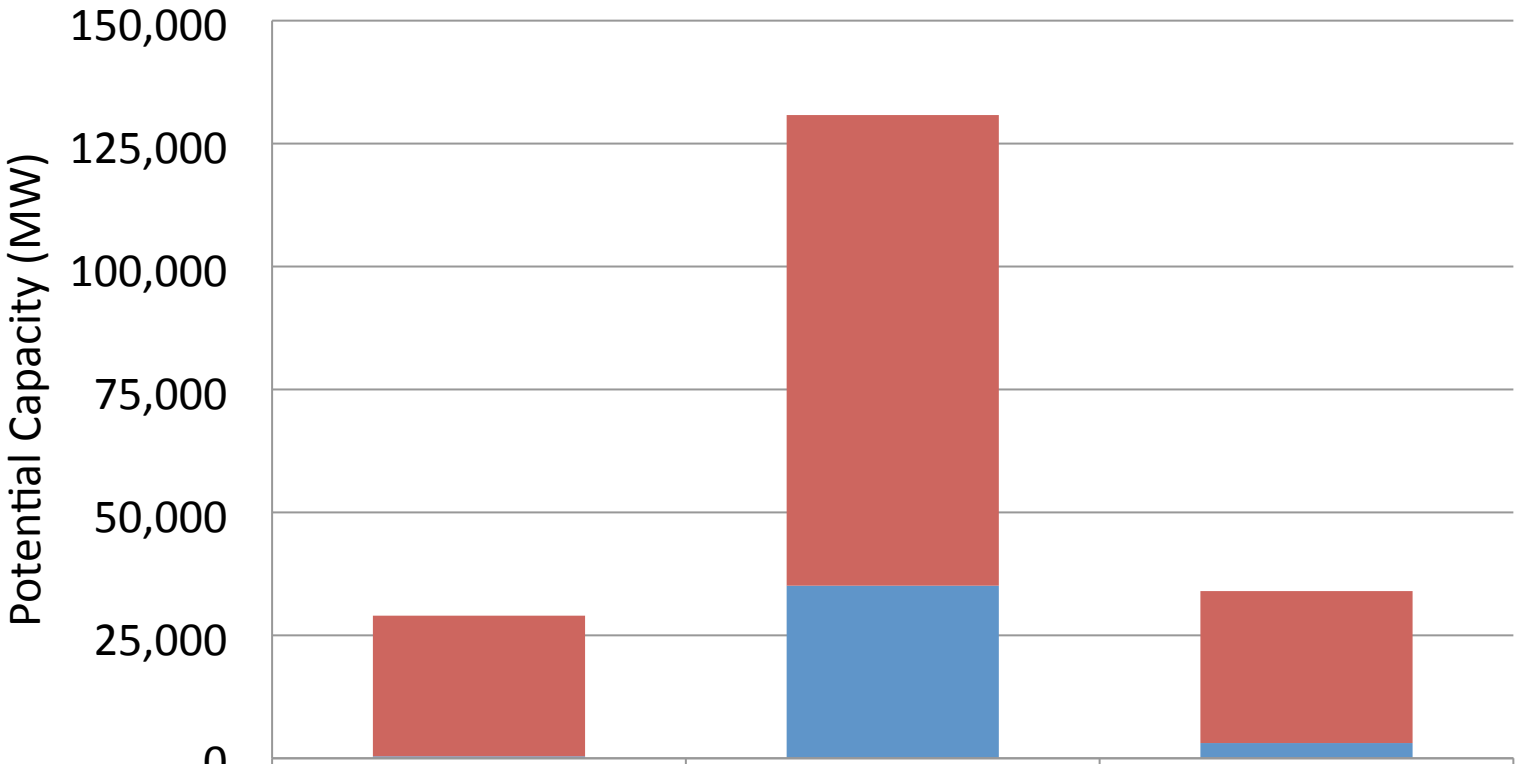
Figure B18. North Carolina detailed map

Assessment of Offshore Wind Energy Resources for the United States

Marc Schwartz, Donna Heimiller, Steve Haymes, and Walt Musial

Technical Report
NREL/TP-500-45889
June 2010

Offshore Wind Potential > 7.5 m/s (< 30 meters)



	GA	NC	SC
> 3 nm	28600	95700	30900
0-3 nm	400	35100	3100

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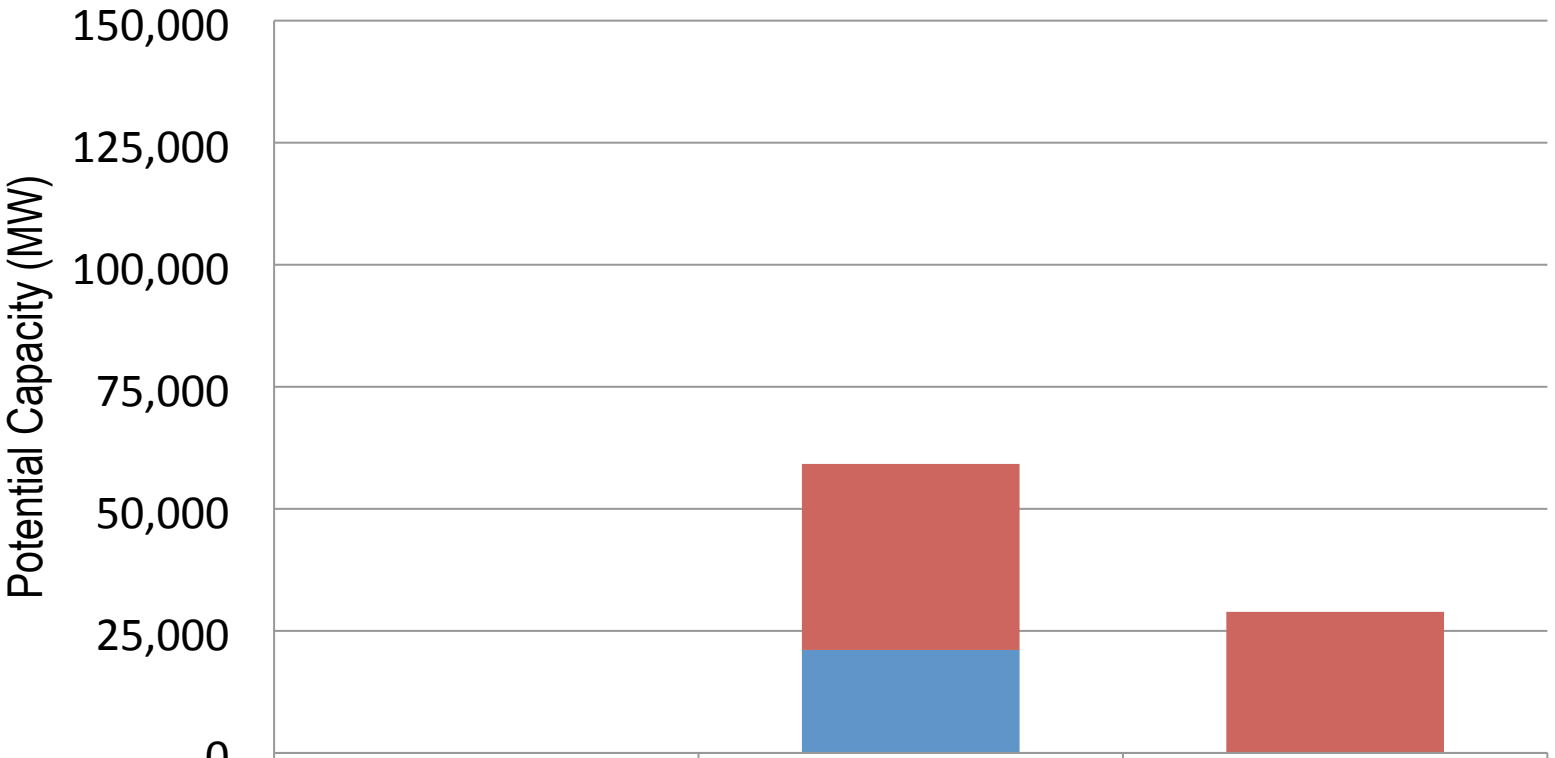

	GA	NC	SC
> 3 nm	0	38100	28800
0-3 nm	0	21100	100

Assessment of Offshore Wind Energy Resources for the United States

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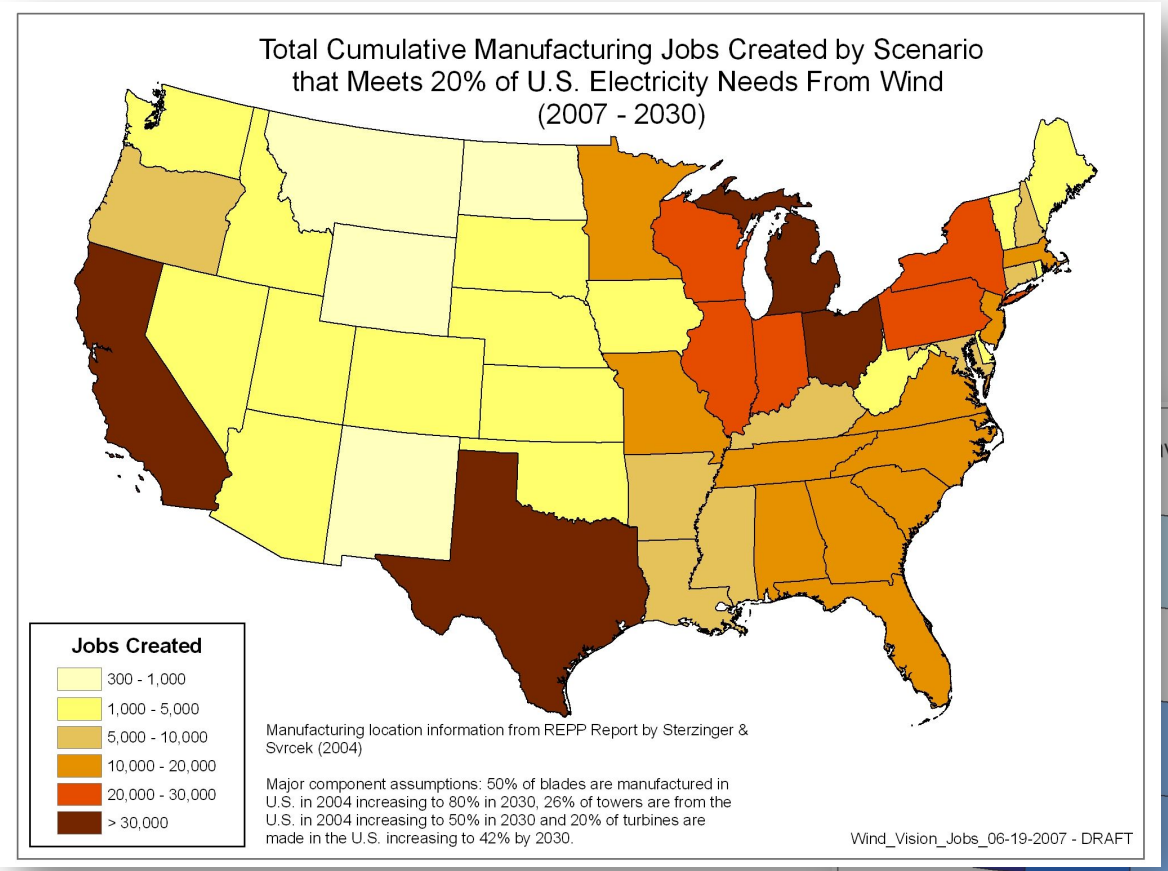
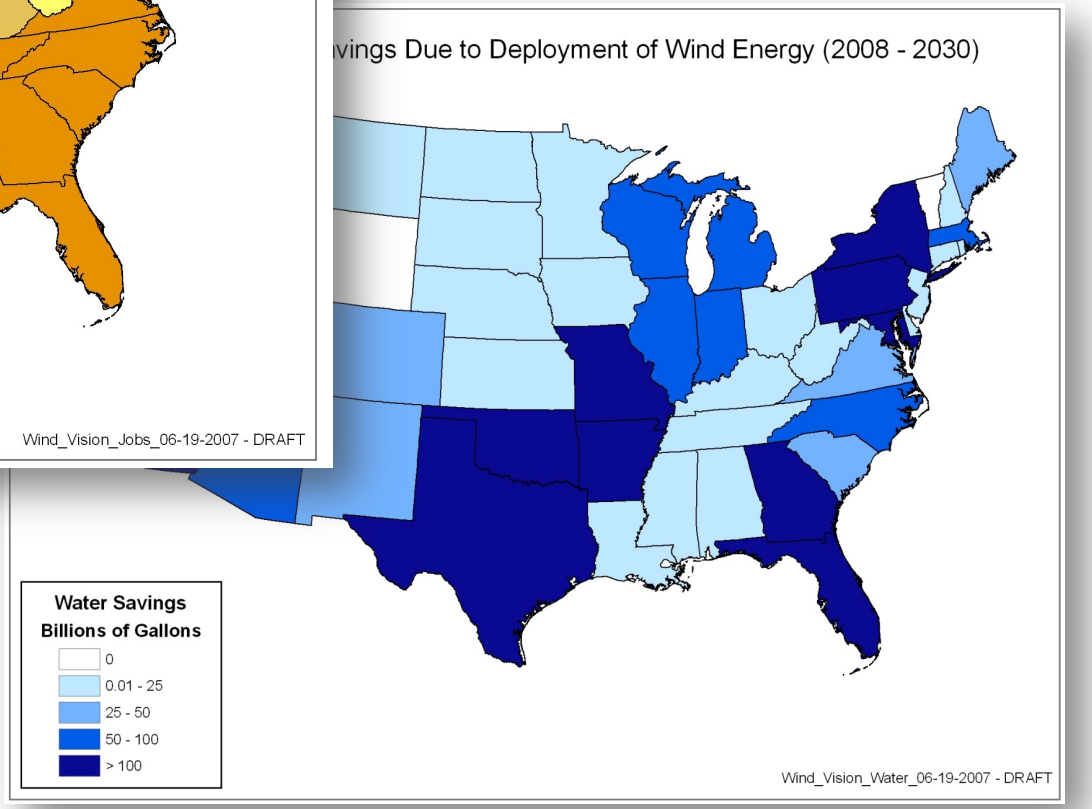
June 2010

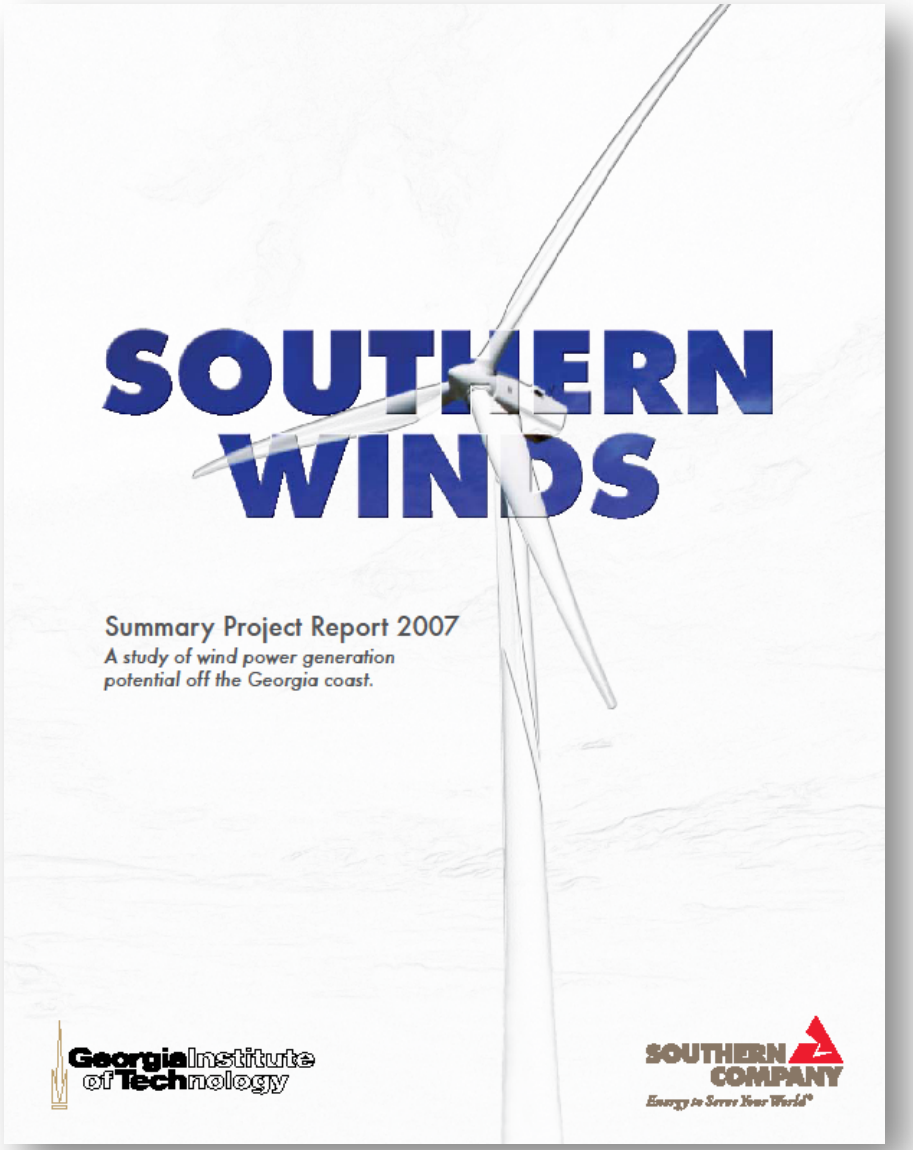
Additional benefits to region have been identified..

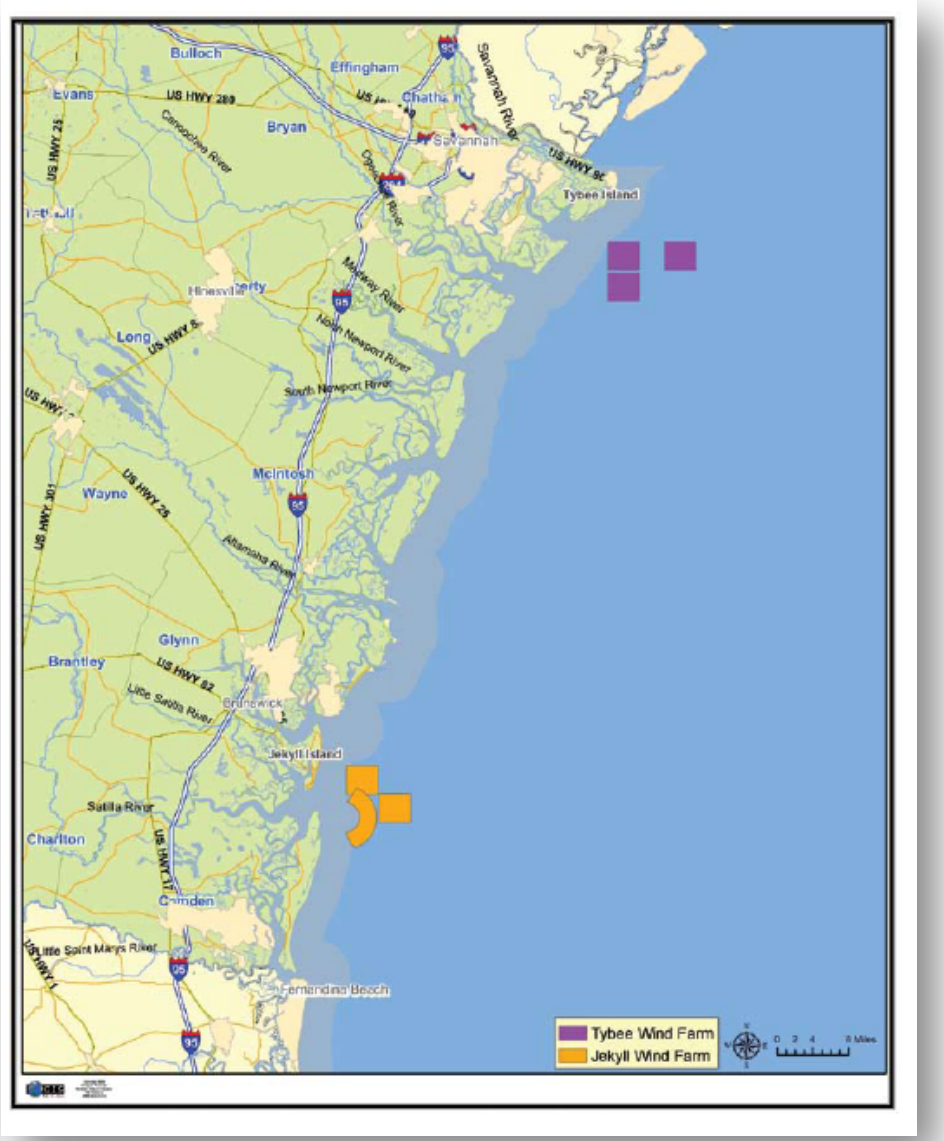




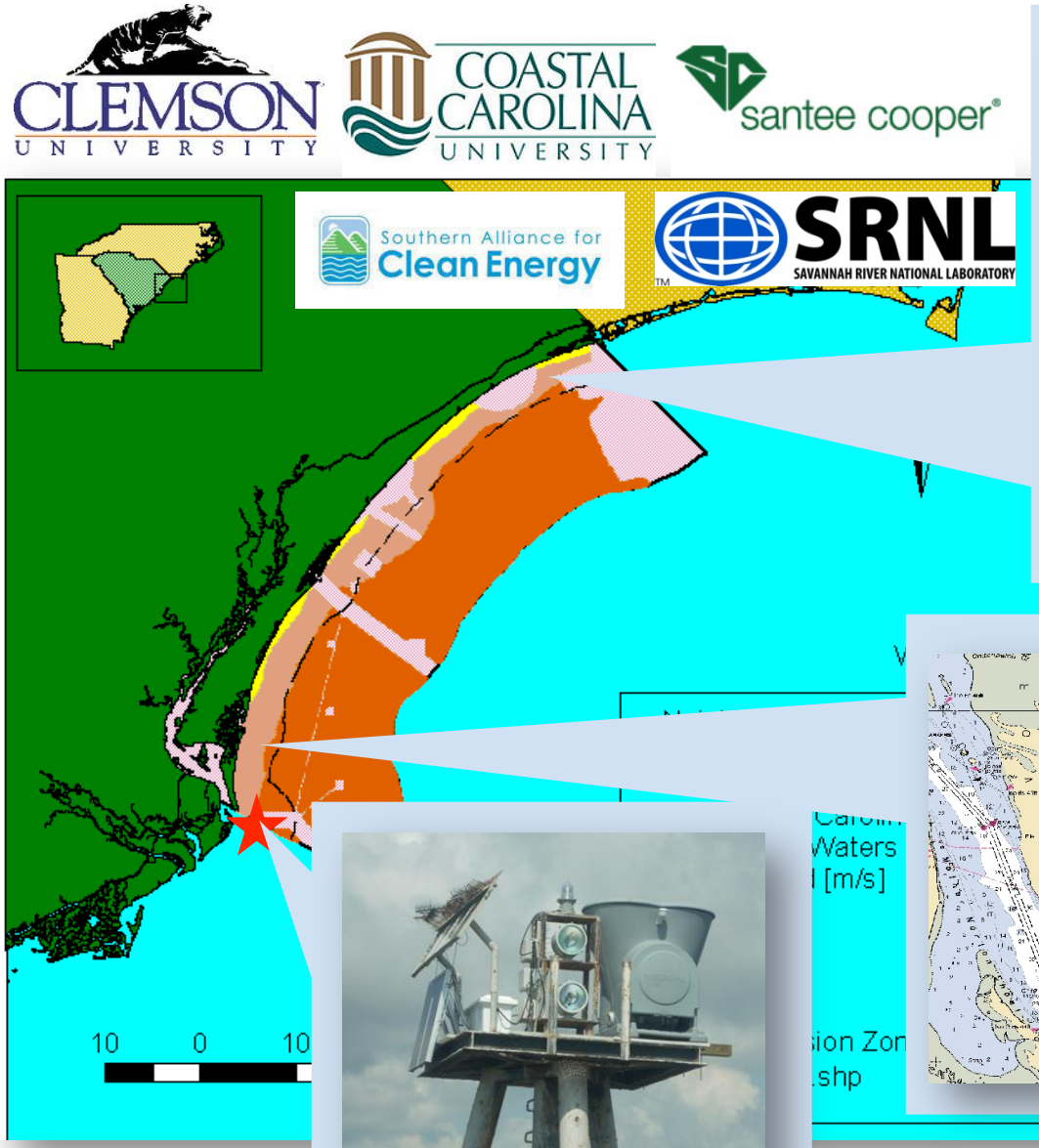
including jobs and water savings.

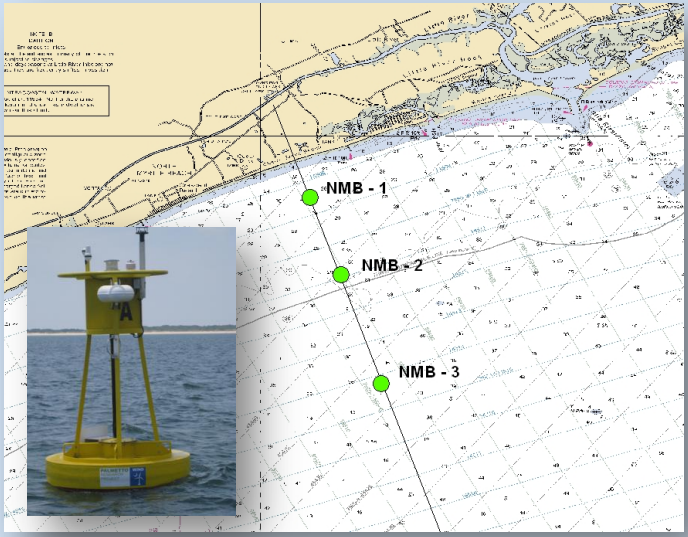
Georgia: Southern Winds Project

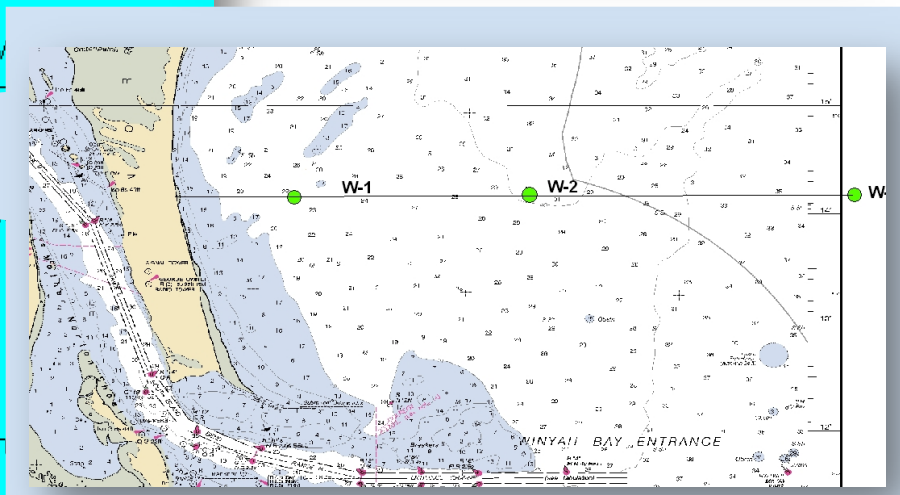




South Carolina: Palmetto Winds



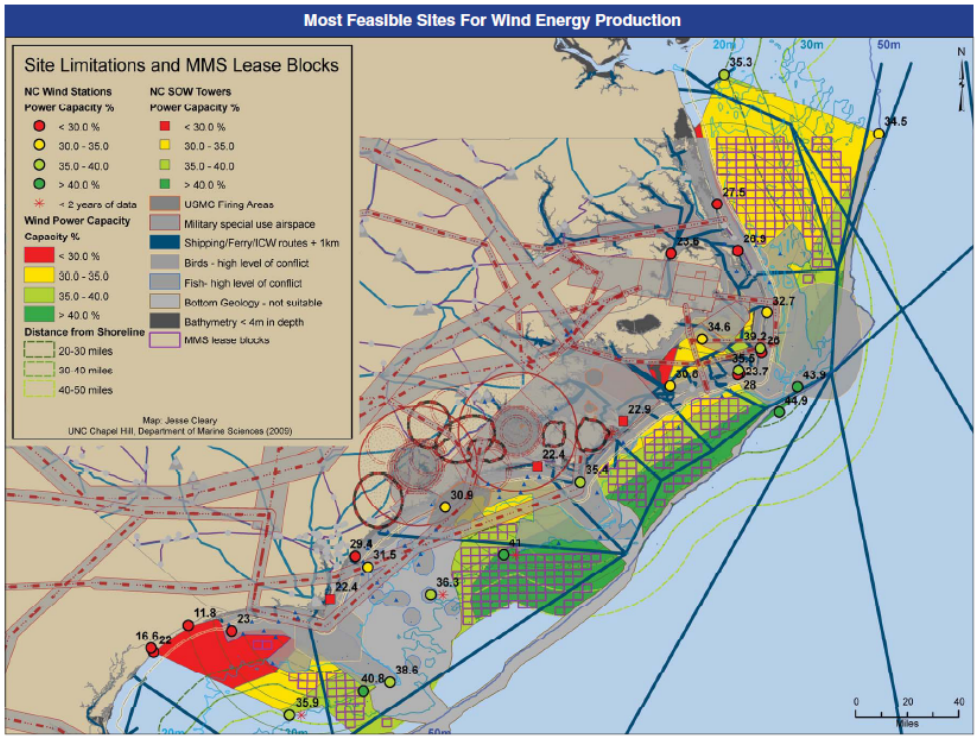




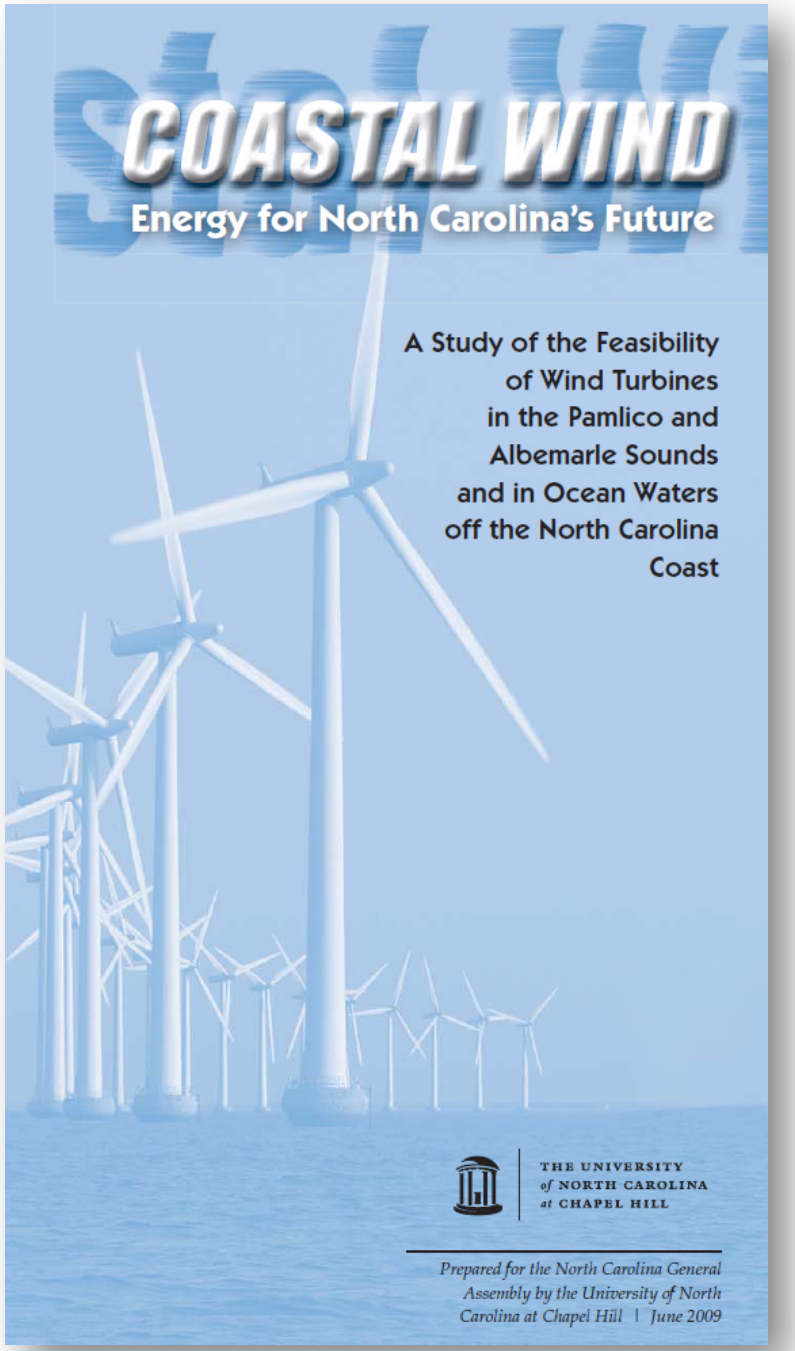
North Carolina: Pamlico Sound Offshore Wind Demonstration Project

THE UNIVERSITY of NORTH CAROLINA at CHAPEL HILL

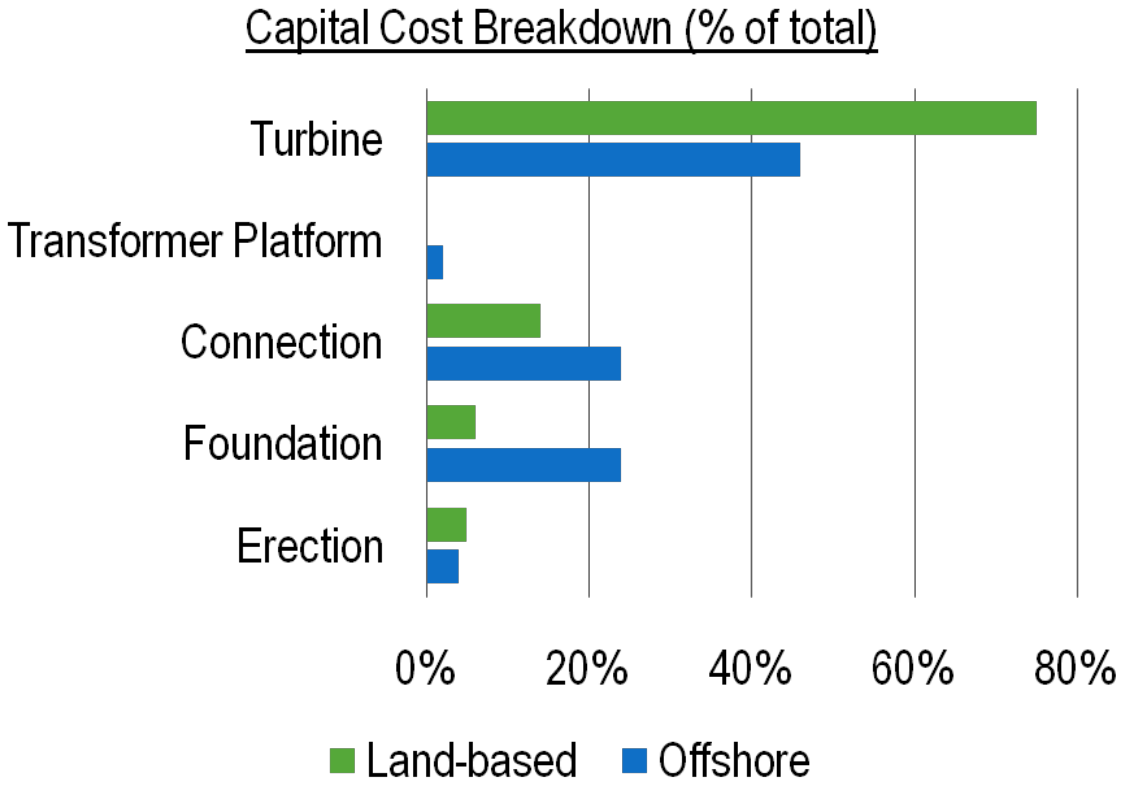
Duke Energy



Exclusion areas (gray regions and blue lines) and potential offshore lease blocks (pink squares) overlaid on color-coded wind capacity factor (red–poor, yellow–marginal, green–good). Large sections of the coastal ocean off North Carolina appear favorable for future development.



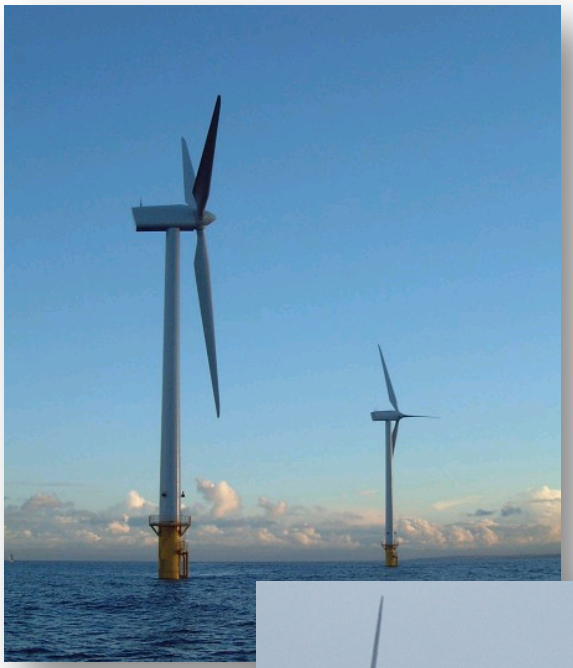
COE (Cost of Energy) still not competitive



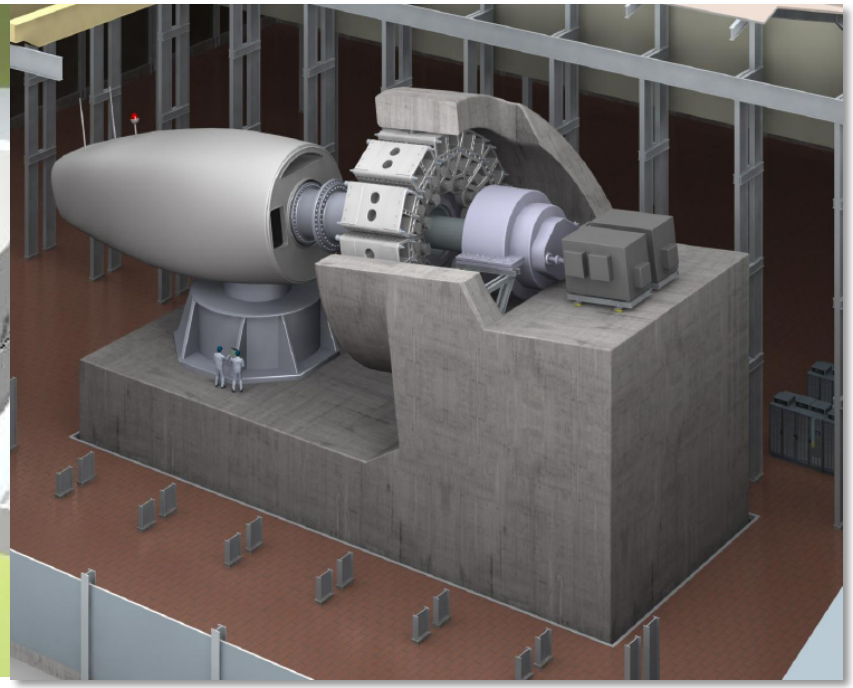
- US land-based costs at < $2M/MW leading to <$50/MWhr PPA
- EU Offshore costs >$3.5M/MW
- Projected costs range from $3.5M to $5.5/MW

Key Drivers for emerging industry

- Policy uncertainty
- Regulatory requirements
- Experience and critical mass
- Supply-chain
- Reducing Cost of Energy Delivered
  - Improved reliability
  - New construction methodology
  - Reduced O&M costs
  - Designing for harsh environment
  - Ancillary services (storage, etc.)



CU Wind Turbine Drivetrain Testing Facility

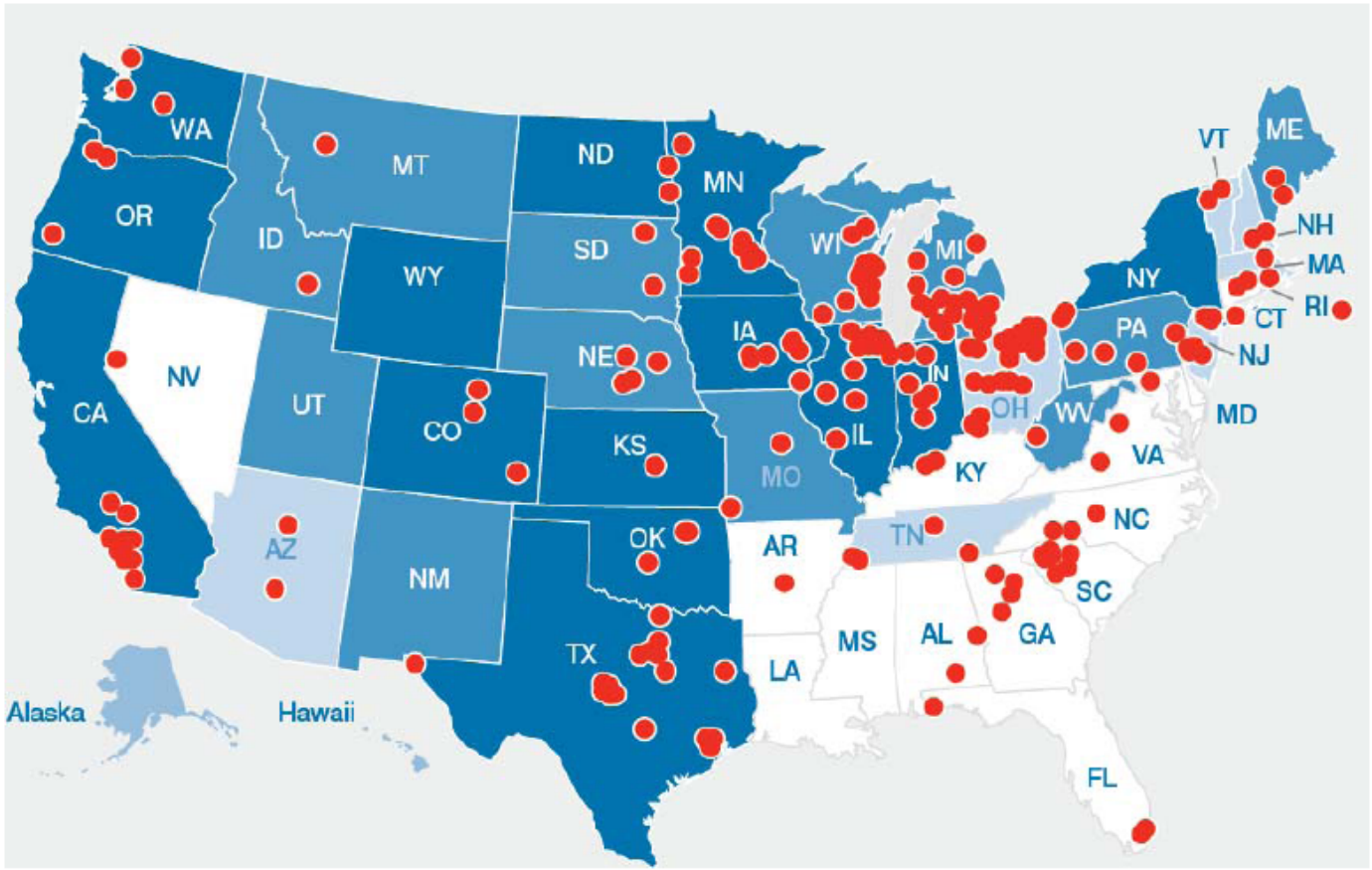


US DOE EERE: DE-FOA-000012

Primary Mission: Provide (1) High Value, (2) High Quality and (3) Cost Competitive testing services , with high integrity and respect for the 'end users' intellectual property.

Secondary Mission: Establish long term partnerships with industry for work force development, research and education.

Southeast is active in the Wind Industry..



Source: American Wind Energy Association U.S. Wind Industry Annual Market Report – Year Ending 2009

despite no commercial installations

Summary

- Southeast land based wind resources currently limited to mountain areas
- Offshore wind resource resides near large and growing demand
- Southeast offshore wind resource is a significant market
- Lack of long-term stable policy increases risk of industry
- Cost of energy delivered needs to come down through innovation and building supply chain
- Southeast active in wind industry with potential for growth